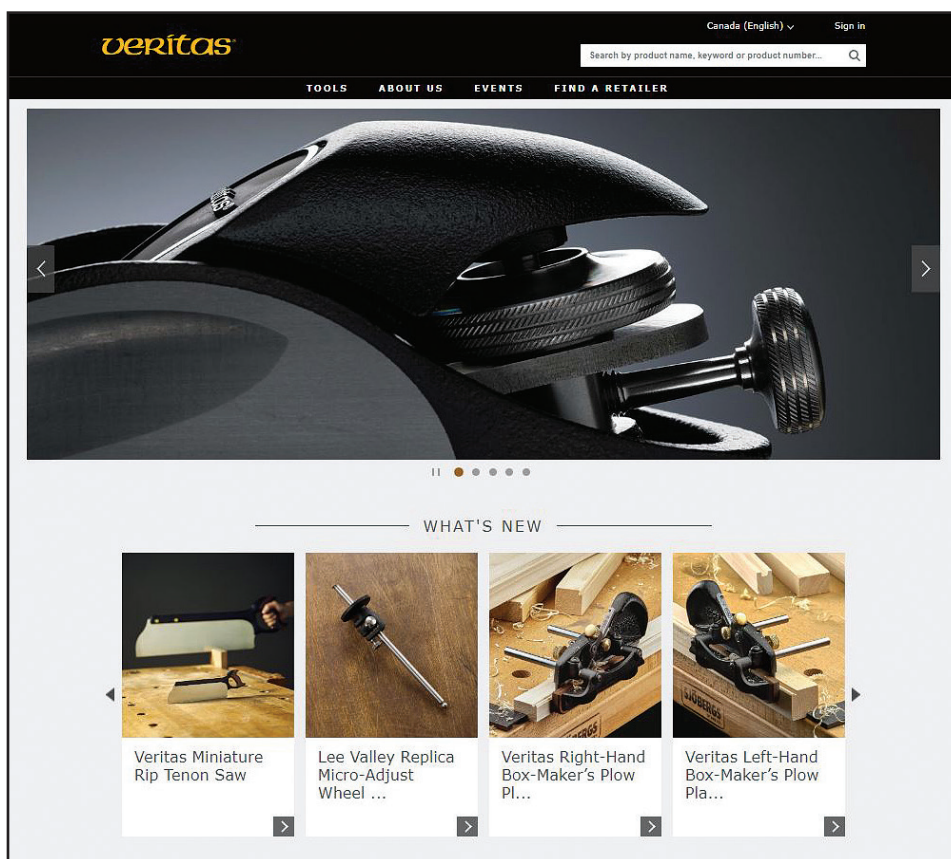


Sharpening by Hand

A Woodworker's Resource Guide



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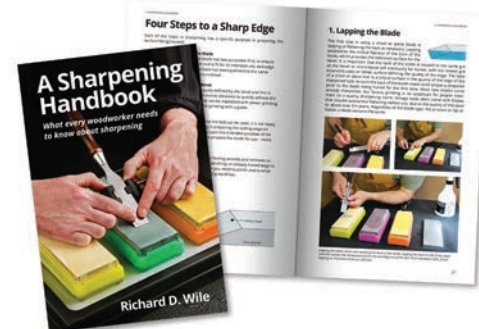
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Other Resources:

A Sharpening Handbook 2021
by Richard D. Wile



The Complete Guide to Sharpening 1995
by Leonard Lee



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How Fine is "Fine"?

When it comes to grading sharpening media, there are several standards used by manufacturers. For abrasive papers, the two most common standards are the US CAMI (Coated Abrasives Manufacturers Institute) standard and the European FEPA (Federation of European Producers of Abrasives) paper standard, which prefixes paper-based grits with the letter P. Japanese manufacturers often use the JIS (Japanese Industrial Standard). Other standards include the FEPA F (for stones and wheels) and the ANSI (American National Standards Institute) standards. At the low end of the scale, say 60x, the five standards are numerically close – CAMI 60x is 268 μ , FEPA P60 is 269 μ , and JIS J60x is also 269 μ . The scales diverge at different rates as the grits get finer: in the 5 μ to 7 μ range, FEPA paper is 5000x, ANSI is 1000x and FEPA F is 800x. All of this can make it difficult to compare grit sizes among manufacturers.

	FEPA P	FEPA F	JIS			
	Paper	Grain	Japan	ANSI	CAMI	Microns
Coarse Grits				70		288
	P60		J60			269
					60	268
		F60				260
Fine Grits		F400				17.3
			J1000	500	600	16
	P1200					15.3
Extra-Fine Grits		F800			1200	6.5
				1000		6.33
	P5000		J3000			5

Our Grit Selection Chart

We have chosen to use effective (or actual) micron grit size as the scale by which we can compare the effective fineness of stones, understanding that particle size alone is not the only determinant of finish. Factors such as grit shape, bonding material and grit durability can all influence effective fineness. We charted five grit standards using micron grit sizes from 4125 μ , down to 0.3 μ , and added Shapton stones, ceramic stones, water stones, diamond stones, oil stones and specialized sheet abrasives to create a table of relative fineness. You can see a condensed chart on the back cover; the full chart can be found by searching for "grit chart" on our website.

Moving from a damaged edge to an ultimate edge involves four stages of sharpening:

1. **Shaping:** establishing the basic profile of the tool, usually required only after major damage
2. **Grinding:** establishing the geometry that defines the edge – bevels and relief
3. **Honing:** preparing the blade for use
4. **Polishing:** imparting a keener edge to a honed blade

We divided our chart into grit ranges appropriate for each sharpening stage, with the last three ranges split into three subranges (low, medium and high, designated by letters A, B and C). Grouping them together in micron-size-based bands reduces the complexity of comparing different products. Conceptually, it makes selecting a sharpening solution for each stage easy while choosing abrasive solutions that complement what you may already own. A good general rule is that for each sharpening stage, you want to move from one range to the next, keeping two or more divisions difference between steps.

Sharpening Stage	Grit Range (μ)	Range Code
Shaping 30.1–150	30.1–150	1
Grinding 10.1–30	20.1–30	2A
	15.1–20	2B
	10.1–15	2C
Honing 3.01–10	8.01–10	3A
	6.01–8	3B
	3.01–6	3C
Polishing 0.25–3	1.51–3	4A
	0.76–1.5	4B
	0.25–0.75	4C

Example 1: A good complement for a King 800x stone (2B) would be something in the (3B) or (3C) range; a Shapton 2000, a King 4000 or a 5 μ diamond paper would all be appropriate choices.

Example 2: A sheet-abrasive-only solution could be 360x (1), 3M 9 μ sheet (3A) and 3M 3 μ (4A). Using this system, you can see at a glance where each product in this catalog falls in the abrasive spectrum and quickly identify what products would be complementary.

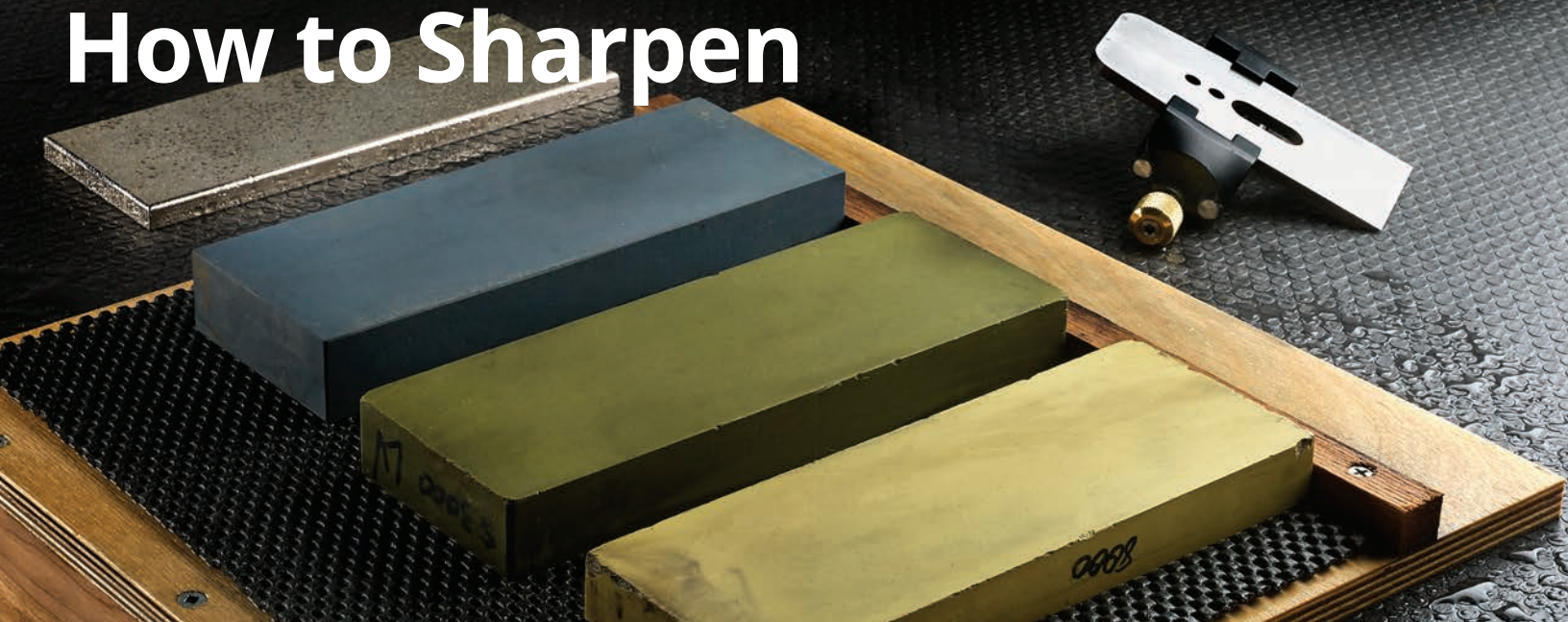


To Strop or Not to Strop

Many woodworkers include a stropping step in their sharpening workflow. Stropping involves pulling a sharpened blade across a flat surface such as wood or leather to refine the edge after honing, and may involve honing compound. This is an effective technique when sharpening softer steels or using medium-grit stones to hone the edge. Since the particle size of most honing compounds is close to that of the finest ceramic stones, an edge will not benefit from stropping if polished on a stone of 10,000x or above.

Stropping can provide a quick tune-up of a dulling edge once or twice before honing is necessary; indeed, many carvers use only a strop to tune up their edges after an initial sharpening. Most cutlery can also benefit from a strop between honings to keep the edge keen.

How to Sharpen

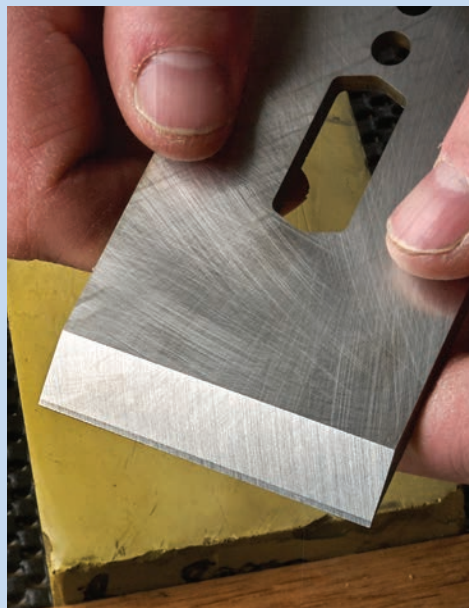


Sharp Tools Make Better Woodworkers

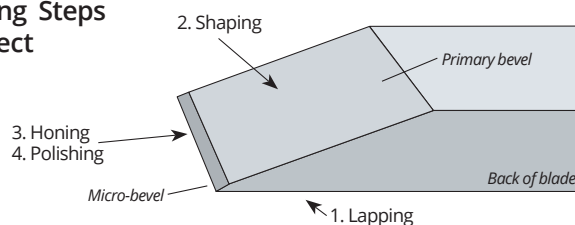
Along with understanding the basic characteristics of wood, knowing how to sharpen your tools is one of the most important skills in woodworking. Sharp tools are safer to use than dull ones, and a sharp tool behaves predictably and requires much less effort for the task at hand. Having an efficient and repeatable sharpening workflow is essential, and getting your tools sharp is not difficult.

Sharpening involves the three key steps of lapping the back of the blade (#1), shaping or grinding the bevel of the blade (#2) and honing the edge (#3). Some woodworkers add the step of polishing the edge (#4) to achieve a higher level of keenness for fine woodworking.

This guide explains the main points of sharpening as well as the purpose and use of the many guides, fixtures, media and accessories designed to make sharpening a breeze.



Four Key Sharpening Steps and How They Affect Blade Geometry



1. Lapping the Back of a Blade

A critical yet often overlooked step in the sharpening process is lapping or flattening the back of the chisel or plane iron. The back of the blade forms half of the cutting edge and is essential to achieving a sharp edge. This step is usually done only on a new blade before its first sharpening to prepare it for a lifetime of use. Most new chisels and plane irons come already lapped on the back; however, a factory grind is no substitute for a full treatment on an extra-fine finishing stone.

Begin by marking the back of the blade near the cutting edge with a marker to indicate the material to be removed. Generally, only the area nearest the cutting edge and the sides of the blade need to be lapped. Most important, this area needs to be polished to the same degree as the bevel side of the blade to ensure both surfaces meet at a consistent sharp edge once sharpening is complete.

Once the back of the blade has been lapped flat, it is unlikely the blade will ever need to be lapped again. A little time up front makes the process much smoother for the long term.

2. Shaping the Bevel of the Blade

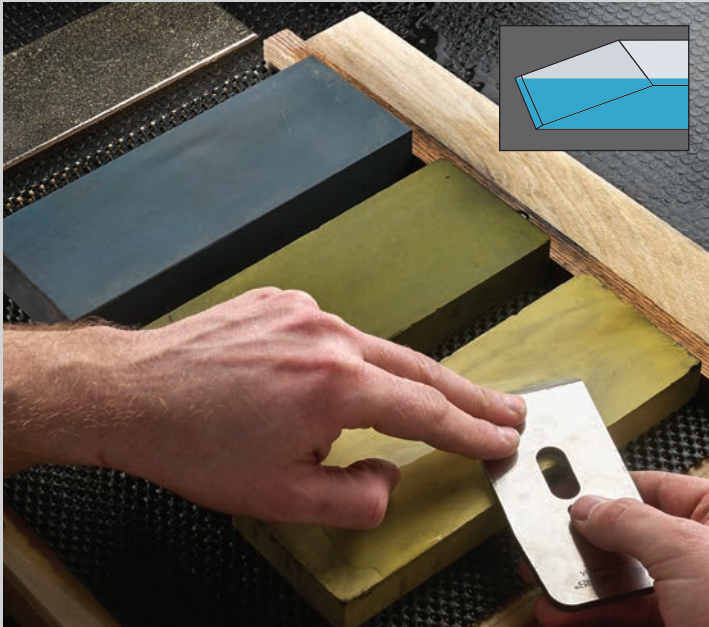
Most edge tools for woodworking have a flat back and a bevelled face, which allows the tool to slice into wood fibers. The angle of the bevel is determined by its intended use. Generally, low-angle blades (10° to 20°) are designed for paring or slicing operations, and medium angles (20° to 30°) are common for bench chisels, many planes and small tools such as spokeshaves. High angles ($30^{\circ}+$) are for durable edges such as mortise chisels, where the blade takes lots of abuse from pounding, as well as in some very low-angle planes.

Typically, blades will come pre-ground with the bevel angle for the intended purpose and will require a minor tune-up before honing. Other times, it is necessary to regrind the bevel when you want to change the angle or the face of the primary bevel for a specific purpose. Woodworkers who work mainly with softwoods such as pine and cedar may want a lower angle on some tools to permit more of a slicing action, where edge durability is less important. Others may want a higher angle to achieve a more durable edge for hardwoods, figured woods and very hard exotics. Adjusting the bevel of a tool allows customization to the task at hand.

Usually, a bevel requires reshaping when the micro-bevel becomes too high on the blade, making the honing process take too long. Generally, when the micro-bevel takes up half the primary bevel, it's time to regrind the primary bevel. For many woodworkers, this could mean reshaping the bevel every 15 to 20 times the edge is honed.

So how is a bevel shaped? With the blade set in the guide at the desired angle, the blade is shaped on coarse media to remove the bulk of the material and finished with a medium or fine stone before honing the edge. Many woodworkers continue with very fine grits to get a mirror polish on the primary bevel; as the primary bevel does not do any of the cutting, this is purely an aesthetic choice.

Four Key Sharpening Steps



1. Lapping the back of a plane iron on the finest stone ensures it is prepared for a lifetime of sharpening.



2. A coarse diamond plate will quickly shape a bevel, followed by a medium stone to remove the scratches left by the diamond plate.



3. Honing the cutting edge on a fine stone prepares it for general use or refines the edge for polishing.



4. Polishing the cutting edge on an extra-fine stone prepares the edge for fine woodworking.

3. Honing the Edge

While lapping the back and shaping the bevel are key steps in the preparation of a blade, only the honing of the edge prepares the cutting edge of the blade for use.

For a blade already prepared with a primary bevel, the blade is mounted in the guide at the micro-bevel angle. A few passes by pulling the blade toward you on the finest stone will establish a keen edge. Once you feel a burr along the entire back edge of the blade, honing is complete. Honing only enough to raise a burr will both save time and allow a greater number of honings before it is necessary to reshape the primary bevel. Often, only eight to ten passes are needed on the fine stone. Then remove the blade from the guide and lap the back on the finest stone to remove the burr.

With efficient workflow, a plane iron can be mounted in the guide, honed, lapped and ready to go back in the plane in less than a minute, reducing sharpening time so you can get back to work.

4. Polishing the Edge

Honing the blade prepares it for woodworking. The keenness of the edge depends on the fineness of the sharpening media used to hone it. Typically, woodworking tools are honed on an 8000x stone or equivalent ($\sim 3\mu$), which is perfect for routine cutting operations. For certain applications, such as final smoothing, or working in difficult materials such as very hard or highly figured woods, it is beneficial to polish the edge to a higher degree.

A blade can be polished in a number of ways, but generally, the use of finer grits will take a blade to a higher level of keenness; however, the keener the edge, the less durable it becomes. The abrasion of the wood will dull a very keen edge faster, making more frequent polishing necessary to maintain that keenness.

Stropping is also a popular way to increase the keenness of an edge, either with the use of honing compound (0.5μ) on plain wood or leather. Sharpening media exist with much finer grits ($<1\mu$) to allow an edge to be polished to razor sharpness if necessary for a given task.

Honing Guides



Use a Honing Guide

The easiest way to get consistent results and a sharpening workflow that is quick and easily repeatable is to use a guide. A honing guide holds the blade at the correct angle and makes quick work of sharpening the edge, regardless of the sharpening media used.

Choosing a Guide

The complete range of Veritas honing guides provides a sharpening solution for every type of blade in the workshop. The new side-clamping honing guide is a flexible and simple-to-use guide for most chisel and plane iron sharpening tasks. The new short-blade honing guide is a unique holding solution for even the most difficult blades that need sharpening. The established Mk.II honing guide system and its accessories will provide a holding solution for the most demanding of woodworkers. To assist in making the right choice, the chart at right provides a snapshot of all the guides and the types of sharpening situations for which they are best suited.

Tool	Veritas Honing Guide			
	 Side Clamping	 Short Blade	 Standard	 Narrow Blade
Bench Chisels	✓		✓	✓
Butt Chisels			✓	✓ <1.5"
Bench Plane Blades	✓	✓	✓	
Tapered Block Plane Blades		✓	✓	
Vintage Block & Bench Plane Blades	✓	✓	✓	
Veritas Plane Blades	✓	✓	✓	
Spokeshave Blades (flat)		✓	✓ w/holder	
Narrow Chisels (<1/4")	✓			✓
Skew Chisels		✓	✓	

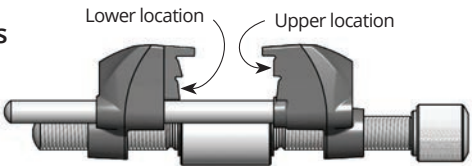


Veritas Side-Clamping Honing Guide

The tried-and-true design of a side-clamping guide is familiar to most woodworkers. Our side-clamping honing guide is a piece of modern-day engineering that improves on this established design while maintaining the flexibility of this type of guide. Chisels and plane blades ranging from 1/8" (3mm) to 2 1/2" fit securely for accurate honing. The unique three-point holding position holds odd shapes such as plow and shoulder plane blades.

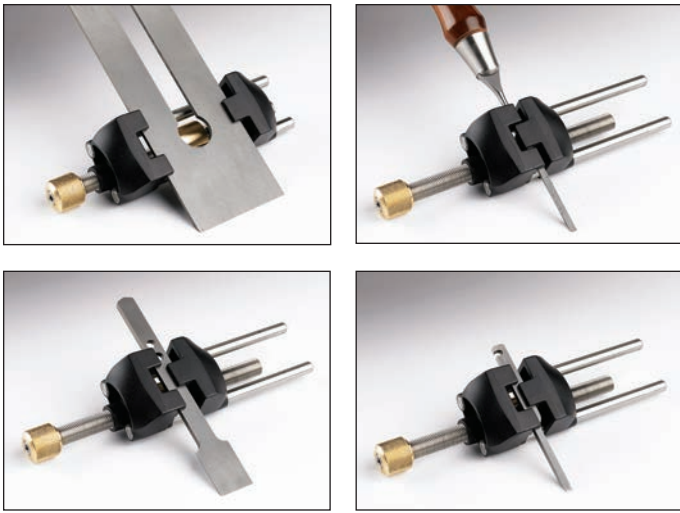
The guide has two different blade positions (upper and lower) that support most types and lengths of chisels and plane blades in a balanced, ergonomic set-up. Most woodworkers will find one of these positions best suits their specific needs and will build a registration jig for that position.

Side-Clamping Blade Positions

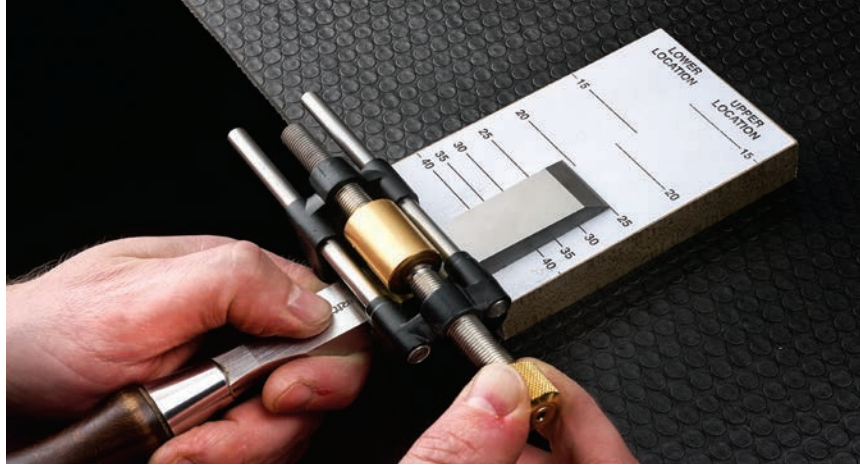


Its simplicity makes this the go-to guide for rapid and repeatable honing for most woodworkers' workflow. Paired with a shop-built registration jig, it will provide a flexible chisel and plane blade sharpening set-up for most workshops.

05M09.40 Side-Clamping Honing Guide



The Veritas Side-Clamping Honing Guide holds a broad range of blades, including bench plane blades up to $2\frac{1}{2}$ " wide, chisels as narrow as $\frac{1}{8}$ " and odd-shaped blades such as shoulder and plow plane blades.



Setting the Blade Extension

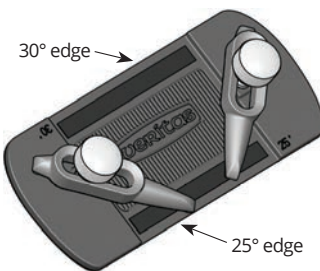
To set the blade extension, butt the front edge of the honing guide against the edge of your user-made registration jig. Turn the clamp knob counterclockwise to open the jaws, then place the blade between the jaws, aligning the blade edge with the appropriate angle mark for the blade location being used. Tighten the clamp knob firmly (but avoid overtightening) and hone the blade.

Veritas Short-Blade Honing Guide

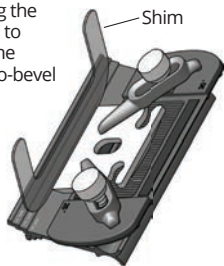
A frequent challenge faced by sharpeners of all skill levels is the safe and accurate honing of small or short blades. Spokeshave, small block plane and palm plane blades are too small for most guides. Our short-blade honing guide has the flexibility to hold small blades that other honing guides cannot handle. Blades up to $2\frac{5}{8}$ " wide are easily aligned with the included registration jig for 25° and 30° . The adjustable fingers on the guide hold blades of all shapes securely at the correct angle. While many of these blades are sharpened with just a primary bevel, the included shim makes it easy to add a micro-bevel.

05M09.30 Short-Blade Honing Guide

Two Primary Bevel Angles



Using the shim to set the micro-bevel



The Veritas Short-Blade Honing Guide securely holds many shapes of short or small blades, including spokeshave and small plane blades, as well as most blades with non-parallel sides and skewed edges.



The registration jig sets the correct blade extension for three blade thicknesses ($\frac{1}{8}$ ", $\frac{3}{16}$ " and $\frac{1}{4}$ ").





Mk.II standard honing guide

Mk.II narrow-blade honing guide

Angle registration jig

The Veritas Mk.II Honing Guide System

The Mk.II honing guide is our complete sharpening system. Combined with the many optional accessories, it solves most challenges faced when sharpening woodworking tools.

The Heart of the System – The Standard Guide

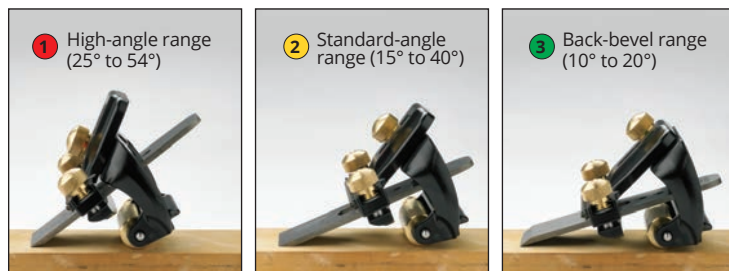
The Mk.II honing guide system is built around the versatile standard honing guide, which holds chisels as narrow as 1/2" and blades as wide as 27/8" and up to 15/32" thick. This guide sets bevel angles from 15° to 54° and a range of back bevels from 10° to 20°.

The angle registration jig slides onto the guide body, centering and squaring the blade with the guide. It features a three-position eccentric roller, allowing adjustment to hone micro-bevels quickly and accurately with only a turn of a knob.

The standard honing guide includes the standard clamping head, straight roller base and angle registration jig. The deluxe honing guide set includes standard and narrow-blade clamping heads as well as an angle registration jig, a straight roller base and a camber roller base.

05M09.01 Standard Honing Guide

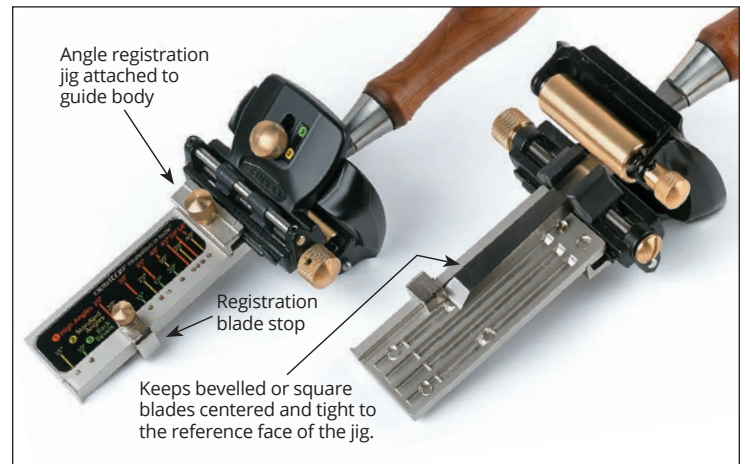
05M09.20 Deluxe Honing Guide Set



How Do I Set the Blade Protrusion on the Guide for the Correct Angle?

The key to using a guide to get consistent and repeatable results is to set the angle for the blade the the same way every time it is placed in the guide. The standard and narrow-blade heads both use the angle registration jig, which mounts to the head, to ensure the blade protrudes correctly for the desired angle and to ensure the blade is mounted squarely in the guide, both critical to achieving good results.

The angle registration jig has three scales; two support a wide variety of blade angles, and the third has options to create a back bevel on a blade. These correspond to a color-coded setting on the guide that is easily changed as necessary. Once the blade is installed, the jig slides off the guide for storage.



Most manufacturers ship blades with grinding marks on the back (or bottom) that, if not removed, would leave a series of fine saw teeth on the tool edge. To avoid these saw teeth, the back of the blade must be lapped flat.

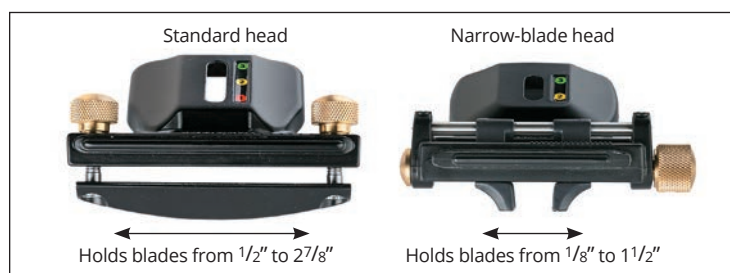
Veritas Honing Guides	Max. Blade Width	Min. Blade Width	Max. Thickness	Short Blades	Angle Range	Skews	Micro-Bevel	Angle Setting
Side-Clamping Honing Guide	2.5"	0.125"	0.45"		15° to 40°		✓	user-made jig
Short-Blade Honing Guide	2.65"	0.25"	0.375"	✓	25° and 30°	✓	✓	two positions
Mk.II Standard Honing Guide	2.89"	0.5"*	0.49"		15° to 54°	✓	✓	registration jig
Mk.II Deluxe Honing Guide	2.89"	0.125"	0.49" (0.7" w/adaptor)		15° to 54°	✓	✓	registration jig
Mk.II Narrow-Blade Honing Guide	1.5"	0.125"	0.49" (0.7" w/adaptor)		15° to 40°		✓	registration jig

* Can clamp much narrower blades, but they tend to skew in use.



Sharpening Chisels & Narrow Blades

The standard head for the standard honing guide holds blades up to 27/8" wide for honing. The narrow-blade honing guide was developed to hold blades from 1/8" to 1 1/2" wide. This self-centering guide clamps the blade securely and makes use of the same angle registration jig as the standard head to set the blade protrusion.



The narrow-blade option is available as a complete honing guide set-up, with straight roller base and angle registration jig. Alternatively, the narrow-blade clamping head can be purchased to swap with the standard clamping head on the standard honing guide.

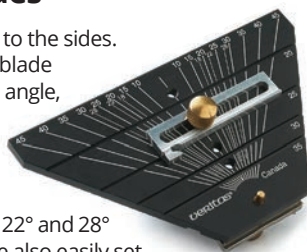
05M09.10 Mk.II Narrow-Blade Honing Guide

05M09.09 Narrow-Blade Clamping Head only

How to Sharpen Skewed Blades

Not all woodworking blades have edges at 90° to the sides. The standard honing guide will hold a skewed blade at the correct angle for honing. To establish this angle, the skew registration jig locks into the standard honing guide, replacing the angle registration jig, and makes quick work of setting left or right skews from 10° to 45° in increments of 5°, with additional marks for 18°, 22° and 28° for most skew plane blades. Custom angles are also easily set.

05M09.03 Skew Registration Jig



Mortise Chisel Sharpening

Mortise chisels present their own challenge for sharpening, as they are usually thicker to provide the strength they need to chop out mortises. The mortise chisel adapter for the narrow-blade honing guide provides enough clearance for these heavy blades up to 1 1/16" thick. The adapter comes with a longer brass bolt and spacer, which installs in seconds on the narrow-blade honing guide. Using the angle registration jig will yield a proper angle in the 30° to 35° range typical for most mortise chisels.

05M09.12 Mortise Chisel Adapter



Should I Camber My Plane Blades?

When planing material wider than the plane blade, such as a tabletop, the sharp corners of the blade can leave scratches. To prevent that, the corner of the blade can be rounded slightly, creating a cambered blade. Many woodworkers camber the blades in their smoother and jack planes.

The simplest technique to camber the blade is to make a few extra passes during the honing phase on the finest stone, pressing first on one side for a few passes and then on the other side for a few passes. This will camber a blade enough for most smoothing.

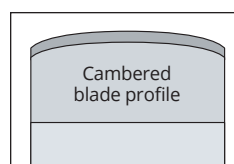
To achieve more consistent results or to create a more aggressive camber, such as for a scrub plane, the Veritas Camber Roller Assembly fits the bill. Replace the straight roller assembly by loosening the brass nut and sliding on the camber roller. The camber roller also has the eccentric roller setting, allowing it to be used for primary and micro-bevels.

05M09.05 Camber Roller Assembly



Straight roller

Camber roller



Camber roller assembly

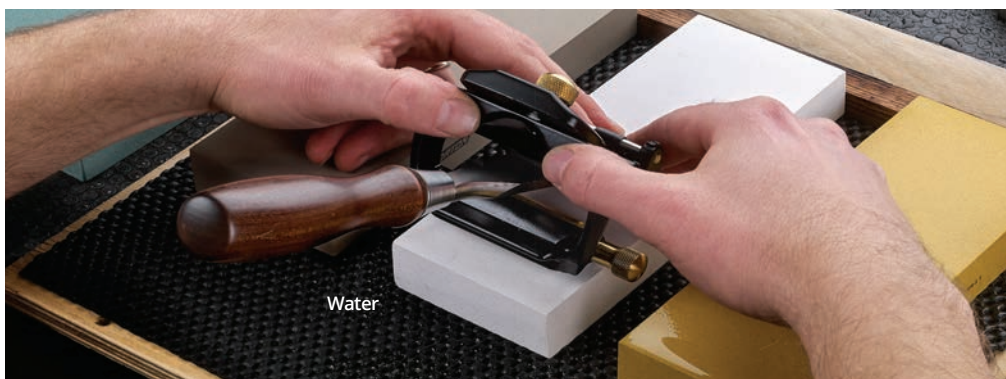


Sharpening Media Choices



Choosing Sharpening Media

Sharpening media comes in many forms, from water stones, oil stones and diamond stones to films, pastes, compounds and paper, providing the woodworker with a vast variety of options for just about any sharpening requirement. Which one you choose comes down to your sharpening workflow as well as cost, space, portability, water access, freezing or humidity, and the tool being sharpened. Modern abrasives quickly remove material from both vintage and modern steels. Most media, when used correctly, will allow you to achieve a sharp edge. We've highlighted the advantages and weaknesses of the most popular options to help you find the one that will best fit your sharpening needs.

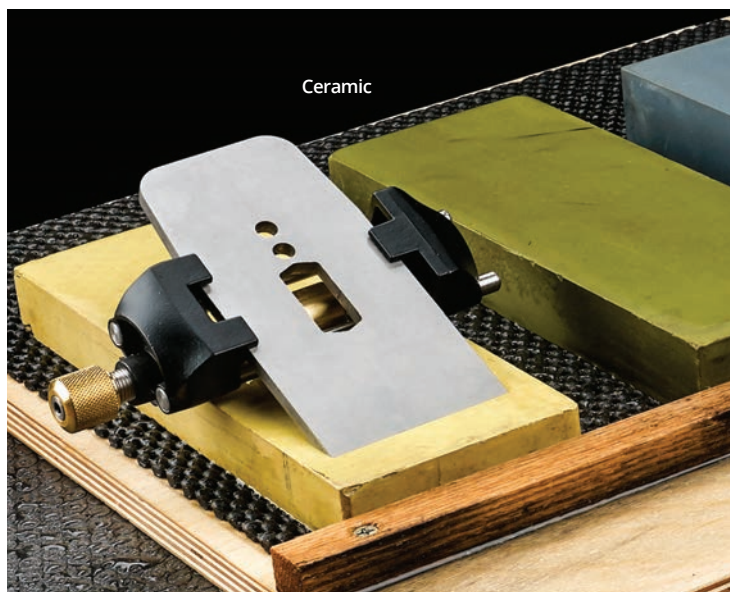


What Are Water Stones?

Water stones are man-made bricks of sharpening media, usually silicon carbide or aluminum oxide, which are held together with a binder, often a resin. Water stones are characterized as being very friable, meaning they release abrasive quickly, often sharpening faster than other types of media. Due to this friability, water stones tend to wear faster than other man-made stones and require flattening more frequently.

Water stones make an economical sharpening choice and are available from coarse 200x to fine 8000x, which meets the needs for many woodworkers looking to achieve a fine edge on their tools.

All water stones require some amount of soaking in water before being used. The stone has soaked long enough when water remains on the surface when it is removed from the water. It is good practice to spritz the surface of the stone during sharpening to keep it from drying out and clogging with metal filings. Stones should be wiped off after use and should not be left immersed in water for extended periods to avoid growing nasty organics.



What Are Ceramic Water Stones?

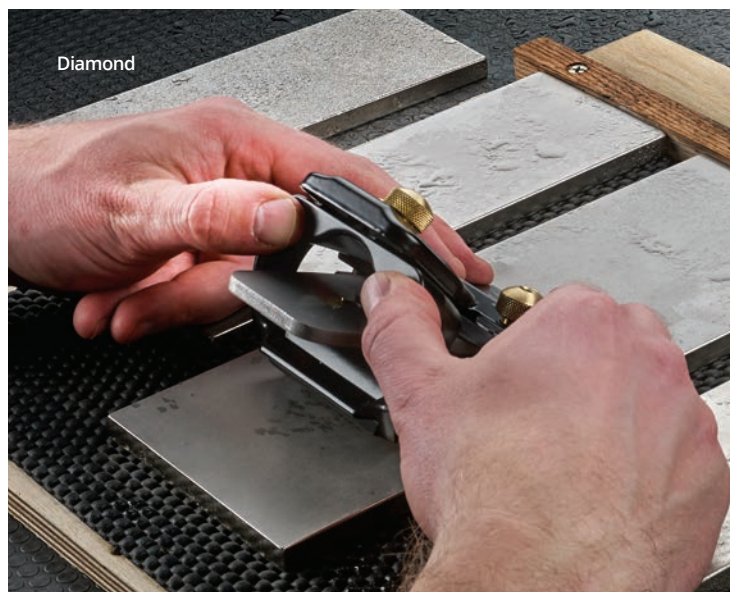
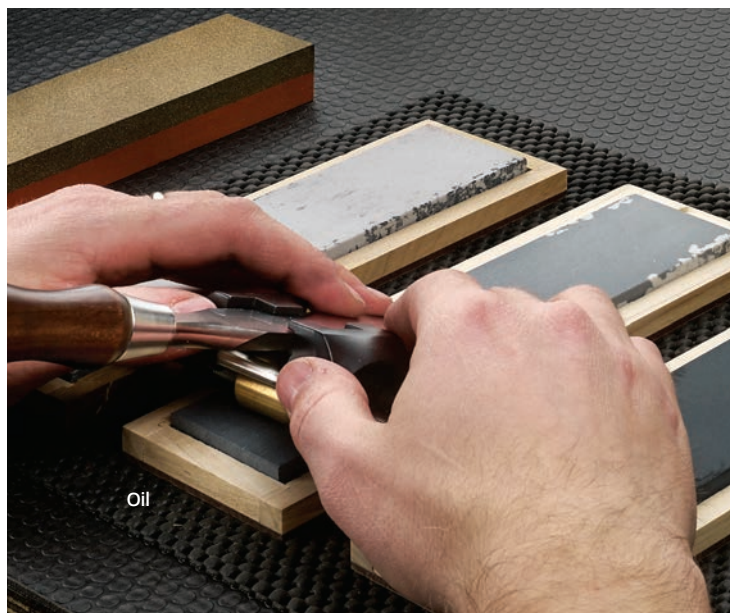
Ceramic stones use water as a lubricant, much the same as regular water stones, but they are usually characterized as harder and slower-wearing. Ceramic stones are man-made bricks of adhesive manufactured using processes such as sintering and pressure to make a very hard stone. Where water stones require soaking before use, most of the finer-grit ceramic stones require only a spray of water to work effectively.

Commonly available ceramic stone brands such as Bester, Imanishi, Sigma, Shapton and Pride are some of the highest quality ceramic stones made. Each brand offers their own unique combination of cutting speed and wear resistance, and most do not require soaking before use. For a true razor edge, ceramic stones come in very fine grits up to 30,000x or 0.5 μ .

What Are Oil Stones?

Oil stones are the original western sharpening medium. In most cases, they were natural stones mined from local rock and flattened for use in sharpening. Today, oil stones are often man-made using aluminum oxide as an abrasive. They require an oil lubricant to keep the stone from clogging and glazing over in use. A honing oil or a light mineral oil provides the right amount of viscosity to keep the stone cutting.

Oil stones cut more slowly than water stones and wear much more slowly, only occasionally requiring flattening on a diamond plate. Oil stones are a great option where water is not suitable, such as at the cottage or in the garden shed, where freezing could damage a saturated water stone.



What Are Diamond Stones?

Diamond sharpening stones are an alternative man-made abrasive bonded to a flat substrate. The premium-quality diamond stones use monocrystalline diamonds, which are highly fracture resistant. Compared to polycrystalline diamonds, monocrystalline diamonds cut more aggressively and fracture less, and therefore last much longer for sharpening applications.

There are two major types of diamond sharpening stones for sharpening edge tools: bench stones that have diamond particles mounted to a plastic substrate with perforations to carry away the filings, and diamond plates that have particles mounted directly to a steel plate. Both are excellent for most sharpening needs and will last for years in most woodworking shops. While both formats are very flat, the steel plates provide a more solid and stable surface.

Diamond stones are simple to use and keep clean, requiring only a bit of water for lubrication and to carry away the filings. Perforations on the surface, requiring a bit less water flushing than the diamond plates. Diamond stones can be used dry but will need regular cleaning to remove build-up of filings.

Sharpening Media Come in Many Forms

Beyond traditional sharpening stones, there are many other forms of abrasive sharpening media available.

Film-based and paper-based abrasives can be attached to a flat substrate such as glass or granite and used in much the same way as stones to sharpen blade edges. Film-based abrasives have the added benefit of flexibility, allowing them to be adhered to shaped materials such as a dowel to sharpen edges of different shapes of carving tools.

Powders and pastes come in a range of grits, from very coarse to support stone flattening to ultra-fine grits designed to get that razor edge.



Sharpening by Hand

This booklet was prepared by Lee Valley and Veritas Tools as a summary of the key steps in sharpening woodworking tools, and to help woodworkers select sharpening media that best matches their workflow.

Sharp Tools Make Better Woodworkers

Moving from a damaged edge to an ultimate edge involves four stages of sharpening. Using a honing guide ensures the greatest consistency and repeatability, which is key to efficient sharpening.

- 1. **Lapping the back of the blade:** required to prepare a new or restored blade for sharpening.
- 2. **Shaping or grinding the bevel:** establishes the geometry that defines the appropriate bevel angle of the edge for its intended use.
- 3. **Honing the edge:** preparing the blade for use; adding a micro-bevel makes quick work of sharpening the edge because you don't have to regrind the entire primary bevel every time.
- 4. **Polishing the edge:** extra-fine stones are used to polish the micro-bevel for fine woodworking, if necessary.

Regardless of the type of woodworking, this method will provide a solid functional foundation on which to establish your own sharpening workflow.

We have profiled and compared the entire Veritas line of sharpening products for hand sharpening. Our side-clamping honing guide is a modern-day version of this classic guide. The short-blade honing guide is designed to hone blades that other guides cannot, such as spokeshave and small block plane blades. The MK.II honing guide system is the complete



system to hand sharpen most types of blades and has helped many thousands of woodworkers improve their sharpening skills. And finally, a discussion of the many sharpening media options – water, ceramic, oil or diamond stones, along with papers, pastes and strops – will help you choose the type of media that best suits your needs.

Dealer Information

Common Sharpening Media Grit Selection Chart

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Sharpening Stage	Range Code	Grit Range (µ)	Stones	Papers/Films/Grit/Compound
Shaping 30.1–150	1	30.1–150	EZE-Lap 150 (141), Shapton Kuromaku 120 (122.5), Shapton GS 120 (122.5), DMT 120 (120), DiaFlat 120 (120), DiaSharp 120 (120), Coarse India (102), Atoma 140 (100), 3M 100µ (100), King 250 (80), King 200 (74), Shapton Kuromaku 220 (66.82), Shapton GS 220 (66.82), Norton 220 (65), Sigma 240 (60), EZE-Lap 250 (60), DMT 220 (60), DiaSharp 220 (60), Pride Abrasive 220 (55), Shapton Kuromaku 320 (45.94), Shapton GS 320 (45.94), Atoma 400 (45), DMT 325 (45), DiaSharp 325 (45), RockStar 320 (40), Fine India (35)	90x (150), 100x (141), P120 (125), 120x (116), P150 (100), 3M 100µ Film (100), 150x (93), P180 (82), 180x (78), P220 (68), 220x (66), P240 (58.5), 240x (53.5), P280 (52.2), P320 (46.2), 280x (44), P360 (40.5), 320x (36), P400 (35), P500 (30.2)
	2A	20.1–30	EZE-Lap 600 (30), Shapton GS 500 (29.4), RockStar 500 (25), Shapton GS7 25.0µ (25), DMT 600 (25), DiaSharp 600 (25), Pride Abrasive 600 (24), Soft Arkansas (22)	3M 30µ Film (30), 360x (28.8), P600 (26), P800 (21.8)
Grinding 10.1–30	2B	15.1–20	King 800 (20), Bester 700 (17), King 1000 (16)	500x (19.7), P1000 (18.3), 600x (16), P1200 (15.3)
	2C	10.1–15	Atoma 1200 (15), EZE-Lap 1200 (15), Shapton Kuromaku 1000 (14.7), Shapton GS 1000 (14.7), Sigma 1000 (14), Pride Abrasive 1000 (14), Norton 1000 (14), King 1200 (13), Shapton GS7 11.5µ (11.5), Bester 1000 (11.5), Hard (Fine) Arkansas (11.5), RockStar 1000 (11)	3M 15µ Film (15), P1500 (12.6), 800x (12.2), P2000 (10.3)
Honing 3.01–10	3A	8.01–10	Shapton Kuromaku 1500 (9.8), DMT 1200 (9.2), DiaSharp 1200 (9.2)	1000x (9.2), 3M 9µ Film (9), P2500 (8.4)
	3B	6.01–8	Shapton Kuromaku 2000 (7.35), Shapton GS 2000 (7.35), Sigma 3000 (7), Shapton GS7 6.70µ (6.7), Bester 2000 (6.7)	P3000 (7), 1200x (6.5)
	3C	3.01–6	RockStar 2000 (6), Norton 4000 (6), Hard Black Arkansas (6), Pride Abrasive 3000 (5), Shapton GS 3000 (4.9), King 4000 (4.5), RockStar 3000 (4), Shapton GS7 4.00µ (4), Shapton GS 4000 (3.68), DiaSharp 4000 (6)	6µ Diamond Paste (6), 3M 5µ Film (5), P5000 (5)
Polishing 0.25–3	4A	1.51–3	RockStar 4000 (3), Shapton GS7 3.00µ (3), Imanishi 4000 (3), Pride Abrasive 6000 (3), Norton 8000 (3), DMT 8000 (3), DiaSharp 8000 (3), Shapton Kuromaku 5000 (2.94), Shapton GS 6000 (2.45), RockStar 6000 (2), Shapton GS7 2.00µ (2), Pride Abrasive 8000 (2), King 8000 (2), Shapton Kuromaku 8000 (1.84), Shapton GS 8000 (1.84), Sigma 10000 (1.5)	3µ Diamond Paste (3), 3M 3µ Film (3)
	4B	0.76–1.5	RockStar 10000 (1.47), Shapton GS 10000 (1.47), Shapton GS7 1.20µ (1.2), Imanishi 8000 (1.2), Pride Abrasive 10000 (1.2), RockStar 8000 (1), Shapton Kuromaku 12000 (1), RockStar 16000 (0.92), Shapton GS 16000 (0.92), Sigma 13000 (0.9), Shapton GS7 0.85µ (0.85)	1µ Diamond Paste (1), 3M 1µ Film (1)
	4C	0.25–0.75	Shapton Kuromaku 30000 (0.49), Shapton GS 30000 (0.49), Shapton GS7 0.44µ (0.44)	3M 0.5µ Film (0.5), Green Compound (0.5), 3M 0.3µ Film (0.3)

Numbers in red are the effective particle size in microns.